DELAWARE SOLID WASTE AUTHORITY

Pasquale S. Canzano, P.E., BCEE
Chief Executive Officer

Richard P. Watson, P.E., BCEE
Chief Operating Officer

June 18, 2012

Mr. Robert Hartman
Department of Natural Resources
and Environmental Control
Division of Waste & Hazardous Substances
89 Kings Highway
Dover, DE 19901

Dear Mr. Hartman:

RE: Gas Probe Monitoring Procedure for Cherry Island Landfill

The purpose of this letter is to submit the revised Gas Migration Monitoring Plan for Cherry Island Landfill (CIL). The revisions include some formatting changes and the removal of the modified well cap from the procedure.

Please let me know if you have any questions or concerns. I can be reached at (302) 764-5385.

Yours truly,

ADMarconi

Angela D. Marconi, P.E.
Cherry Island Landfill Gas Manager

ADM:ur

c: A. M. Germain, P.E., BCEE
R. M. Roddy, P.E., BCEE
D. A. Fluman
M. M. Kiliszek

Cherry Island Landfill
Gas Migration Monitoring Plan

(Revised June 13, 2012)

I. Background

A. This plan has been developed to comply with:

1. Section 5.5.1.3 of the Delaware Regulations Governing Solid Governing Solid Waste;
2. Section III.E. SW-06/01 – Permit Renewal for the Operation of the NSWMC-2 – received January 6, 2006.

B. This plan covers landfill gas migration monitoring at the perimeter of the facility and in buildings and structures located within the boundaries of the Cherry Island property line. The landfill gas migration monitoring is performed to ensure the health and safety of all persons on or near the landfill with regards to explosive gas.

II. Rights and Responsibilities

A. DSWA holds the rights to all landfill gas generated at CIL. DSWA and its Contractors are responsible for specific regulatory monitoring for SW-06/01.

B. DSWA or it's designated contractors shall be responsible for:

1. Conducting specific regulatory monitoring in buildings and structures;
2. Conducting specific regulatory monitoring of perimeter landfill gas migration monitoring probes (GPs) along the perimeter boundary of CIL.

III. Gas Monitoring Instrumentation

A. Only gas-monitoring instruments capable of measuring the target gases of concern as listed below in % by Volume shall be used for monitoring buildings, structures, and GPs. The target gases of concern are following:

1. Methane (% by Volume)
2. Carbon dioxide (% by Volume)
3. Oxygen (% by Volume)
4. Balance Gas (% by Volume) may be calculated based on [100% - (a+b+c above)].

B. Certified span gases as recommended by the manufacturer shall be used to calibrate all gas-monitoring instruments.

C. Gas-monitoring instruments to be used for measuring gas concentrations in the buildings, structures and GPs shall be calibrated using a span gas containing known concentrations of Methane, Carbon dioxide and Oxygen.

D. Gas-monitoring instruments used to monitor buildings, structures and GPs shall be calibrated immediately prior to the initiation of monitoring activities. Instrument error shall not exceed the error tolerances set forth by the manufacturer.

E. Gas-monitoring instrument calibration shall be noted on the gas inspection forms located on pages 9 and 10 of this Plan. These forms are to be used by the sampling crews for monitoring and record keeping purposes.

IV. Monitoring Frequency

As a minimum, monitoring of the buildings, structures, and GPs shall take place on a quarterly basis. Additional monitoring may be required based on the results of quarterly monitoring.

V. Permit Monitoring

A. Quarterly Monitoring of Buildings and Structures

1. During each calendar quarter, DSWA or its third-party contractor shall monitor all rooms and closets in the buildings and structures onsite for the gases listed in Section III.A. above. This shall include but not be limited to:

   a. DSWA Administration Building
   b. Scale Houses
   c. Landfill Gas Operations Trailers
   d. Maintenance Building
   e. Pump Station Buildings
   f. Landfill Gas Maintenance Shop
   g. Storage Garages

2. Procedures to be used for monitoring the buildings and structures shall be as described in Section VIII below.

3. Measurements of each target gas shall be recorded on the *"Building Inspection Form for Landfill Gas"* provided on page 8 of this Plan.

4. During the quarterly monitoring event, weather information shall be retrieved from the on-site weather station. This information shall also be recorded on the *"Building Inspection Form for Landfill Gas"* provided on page 8 of this Plan.

5. Weather information to be recorded shall include:

   - Inspection Date
   - Time
   - Temperature (°F)
   - Solar Radiation (Kcals/cm^2)
   - Barometric Pressure (inches of Hg)
   - Wind Speed (MPH)
   - Wind Direction (Degrees from True North)
   - Cloud Cover (%)
   - Whether is was raining or not

B. Continuous Monitoring of Buildings and Structures

1. DSWA shall outfit the pump stations and office/mechanical buildings with continuous combustible gas monitors and alarms.

2. As a minimum, inspection and maintenance of combustible gas alarms shall be performed on an annual basis.

C. Quarterly Monitoring of Landfill Gas Migration Monitoring Probes

1. Gas Probes (GPs) 2, 10, 11, 23 and 26 shown in Figure 1 on page 7 of this Plan shall be monitored.

2. During each calendar quarter, DSWA or its third party environmental monitoring contractor shall measure the concentrations of gases listed in Section III.A. above in GPs installed along the CIL site boundary.

3. Procedures to be used for monitoring the GPs shall be as described in Section VIII below.

4. Measurements of each gas shall be recorded on the *"Landfill Gas Migration Inspection Form"* provided on page 9 of this Plan.

5. During the quarterly monitoring event, weather information shall be retrieved from the on-site weather station. This information shall also be recorded on the *"Landfill Gas Migration Inspection Form"* provided on page 9 of this Plan. Weather information to be recorded shall include:

- Inspection Date
- Time
- Temperature (°F)
- Solar Radiation (Kcals/cm^2)
- Barometric Pressure (inches of Hg)
- Wind Speed (MPH)
- Wind Direction (Degrees from True North)
- Cloud Cover (%)
- Whether is was raining or not

VI. Exceedances

If the concentration of explosive gas exceeds the limits specified in Section 5.E.1.c of the DRGSW (25% of the lower explosive limit (LEL) of methane (1.25% v/v) in facility structures, or at the facility boundary) DSWA will follow the Response Actions defined in Section 5.E.4 of the Delaware Regulations Governing Solid Waste.

VII. Recordkeeping

A copy of the Building Inspection and Landfill Gas Migration Monitoring Forms shall be kept as part of the facility records. These forms shall be included as part of the Annual Environmental Monitoring Report submitted to the Solid and Hazardous Waste Branch of DNREC on an annual basis.

VIII. Monitoring Procedures

A. Buildings and Structures

1. All buildings and structures shall be monitored on the same day during the sampling event.

2. Gas measurement shall be complete when the methane reading stabilizes within +/- 0.2% or after 5 minutes.

3. The field crew will record the gas measurements from the gas-monitoring instrument in both their field logs and on the Building Inspection Form found on page 8 of this Plan.

   Once monitoring of all buildings and structures is complete, the field crew will obtain and record the following meteorological readings from the CIL weather station on the Building Inspection Form:

   - Inspection Date
   - Time
   - Temperature (°F)
   - Solar Radiation (Kcals/cm^2)
   - Barometric Pressure (inches of Hg)
   - Wind Speed (MPH)
   - Wind Direction (Degrees from True North)
   - Cloud Cover (%)
   - Whether is was raining or not

B. Perimeter Landfill Gas Migration Monitoring Probes (GPs)

1. Monitoring requires taking field measurements from a series of GPs installed along the western and northern property boundaries of the facility. The action level at the point of compliance is 25% of the LEL for methane.

2. All GPs shall be monitored on the same day during the sampling event.

3. Prior to initiation of testing for explosive gases, the sampling crew will unlock and remove ALL GP aluminum well lids and expansion caps from the GP casings. This will allow time for ventilation of the headspace in the GP prior to the taking of explosive gas measurements. This is necessary because trace amounts of explosive gases may be trapped and build up in the headspace of the GP between monitoring events. Once all expansion caps have been removed from all GPs, the sampling crew will proceed with the following monitoring protocols:

   a. The field crew will return to the first GP that was uncapped and measure the depth to liquid (DTL). Measurements of the DTL will take place in triplicate. The three DTL measurements will be recorded in the field crew's log. The average of the three readings will be recorded on the Perimeter Landfill Gas Migration Monitoring Form (Attachment I, Form 2).

b. Once the DTL has been measured, the field crew will thread 4' to 6' of sample tubing into the casing of the GP, switch the gas-monitoring instrument from standby to operational mode, and begin taking the field measurements for gases listed in Section III. A. above.

c. Gas measurement shall be complete when the methane reading stabilizes within +/- 0.2% or after 5 minutes.

d. The field crew will record the gas measurements from the gas-monitoring instrument in both their field logs and on the Landfill Gas Migration Inspection Form found on page 9 of this Plan.

e. Once measurement of the gas concentrations has been completed at the GP, the field crew will, re-seal the GP with the expansion cap, and replace and lock the aluminum well lid.

f. Once the GP has been secured, the field crew will purge the gas-monitoring instrument using ambient air.

g. Once monitoring of all GPs is complete and all GPs have been secured, the field crew will obtain and record the following meteorological readings from the CIL weather station and record them on the Landfill Gas Migration Inspection Form found on Page 9 of this Plan:

- Inspection Date
- Time
- Temperature (°F)
- Solar Radiation (Kcals/cm^2)
- Barometric Pressure (inches of Hg)
- Wind Speed (MPH)
- Wind Direction (Degrees from True North)
- Cloud Cover (%)
- Whether is was raining or not

IX. Surface Emissions Monitoring

Surface emission monitoring will be performed on a quarterly basis in the area between the edge of waste and the fence line along the West side of Phase I. DSWA or its contractors will follow the procedures outlined in the Cherry Island air permits. The reporting limit will be 500 ppm. The follow up timeframe will be determined on a case-by-case basis. Follow up actions will include increased gas extraction on the landfill, and cover repairs.

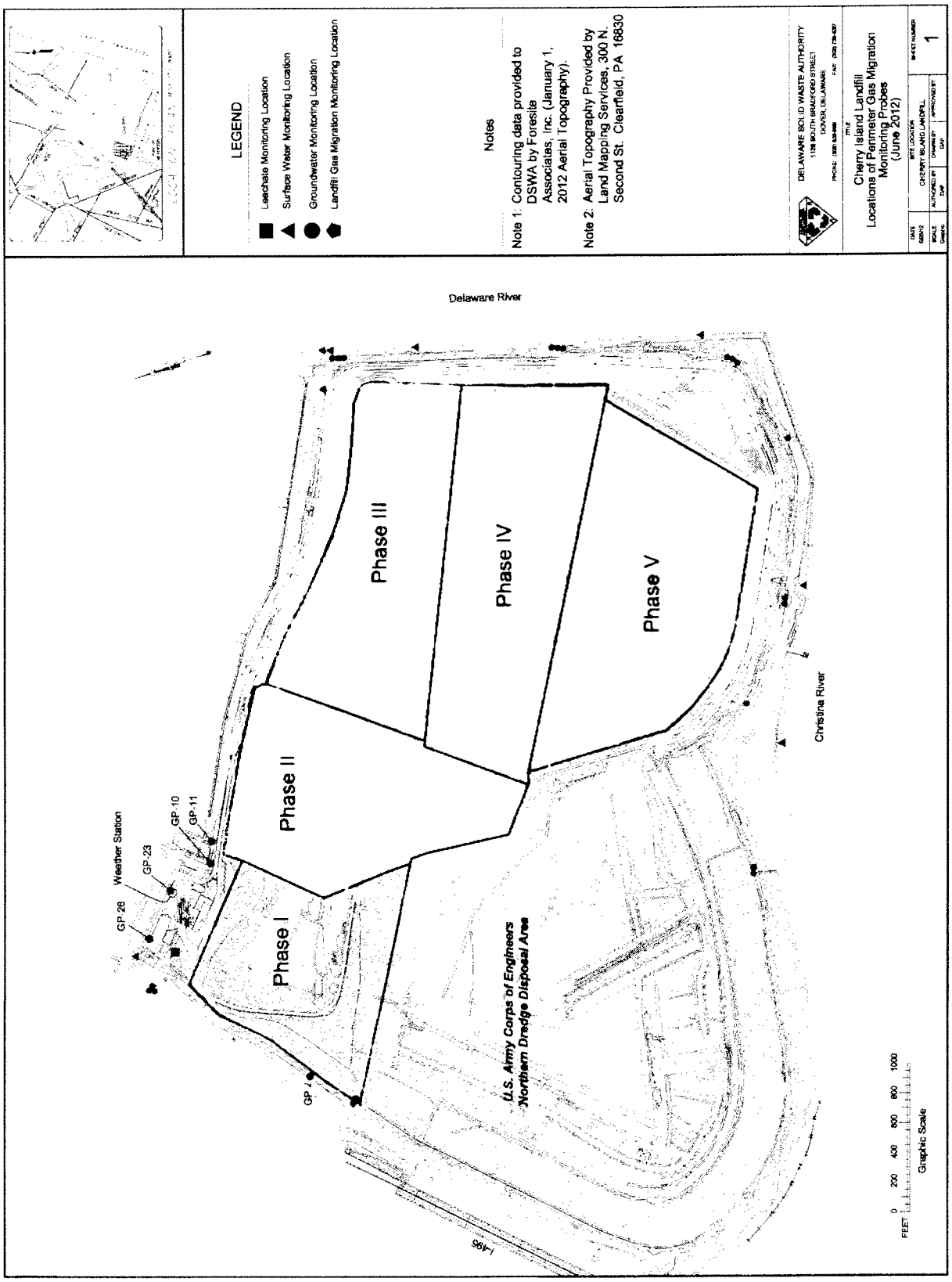
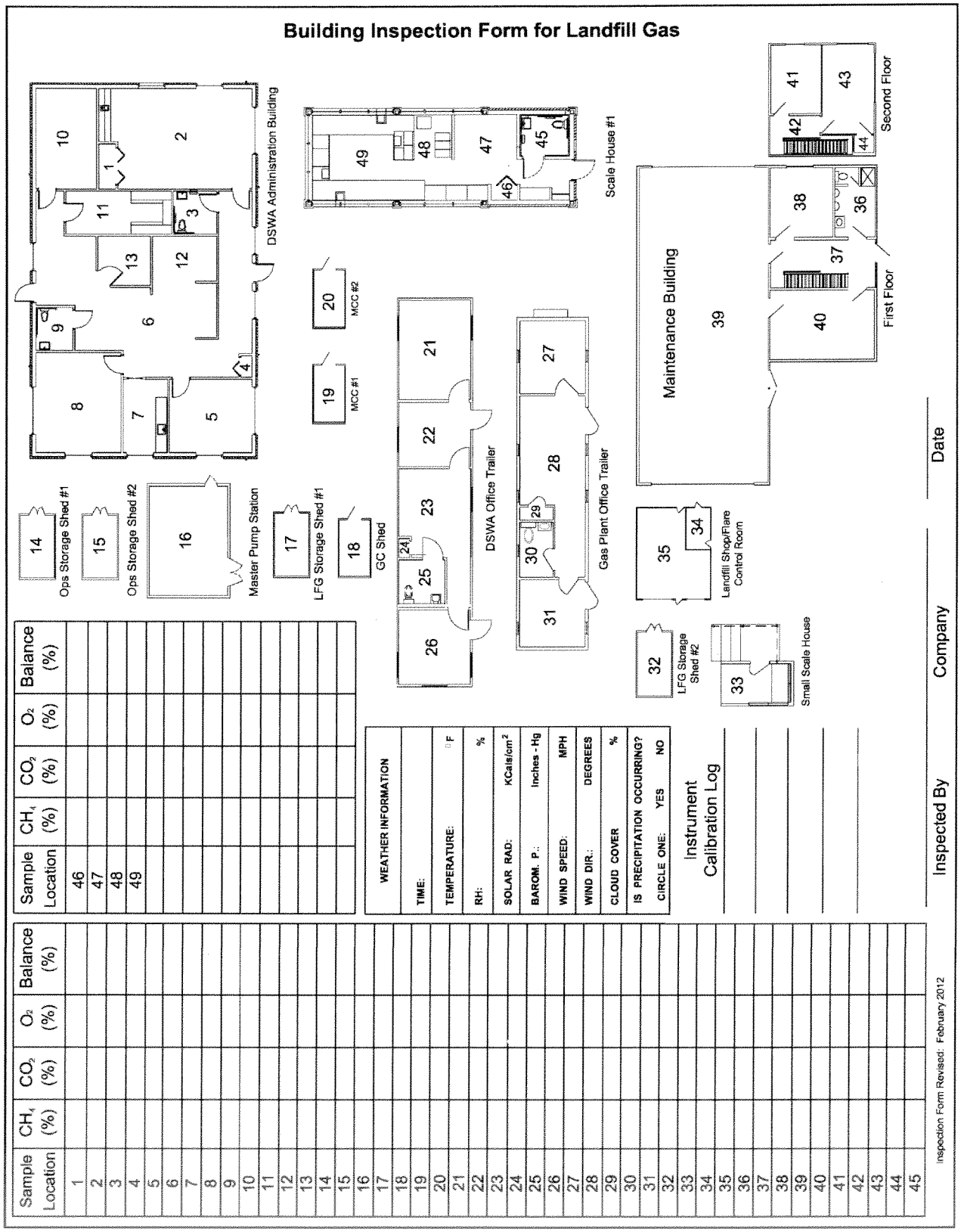

LEGEND
Leachate Monitoring Location
Surface Water Monitoring Location
Groundwater Monitoring Location
Landfill Gas Migration Monitoring Location
Notes
Note 1: Contouring data provided to DSWA by Foresite Associates, Inc. (January 1, 2012 Aerial Topography).
Note 2: Aerial Topography Provided by Land Mapping Services, 300 N. Second St. Clearfield, PA 16830
DELAWARE SOLID WASTE AUTHORITY
1128 SOUTH BRADFORD STREET
DOVER, DELAWARE
Cherry Island Landfill
Locations of Perimeter Gas Migration Monitoring Probes
(June 2012)
Delaware River
Phase I
Phase II
Phase III
Phase IV
Phase V
Christina River
U.S. Army Corps of Engineers
Northern Dredge Disposal Area
Weather Station
GP-10
GP-11
GP-23
GP 28
I-495
0 200 400 600 800 1000
FEET
Graphic Scale

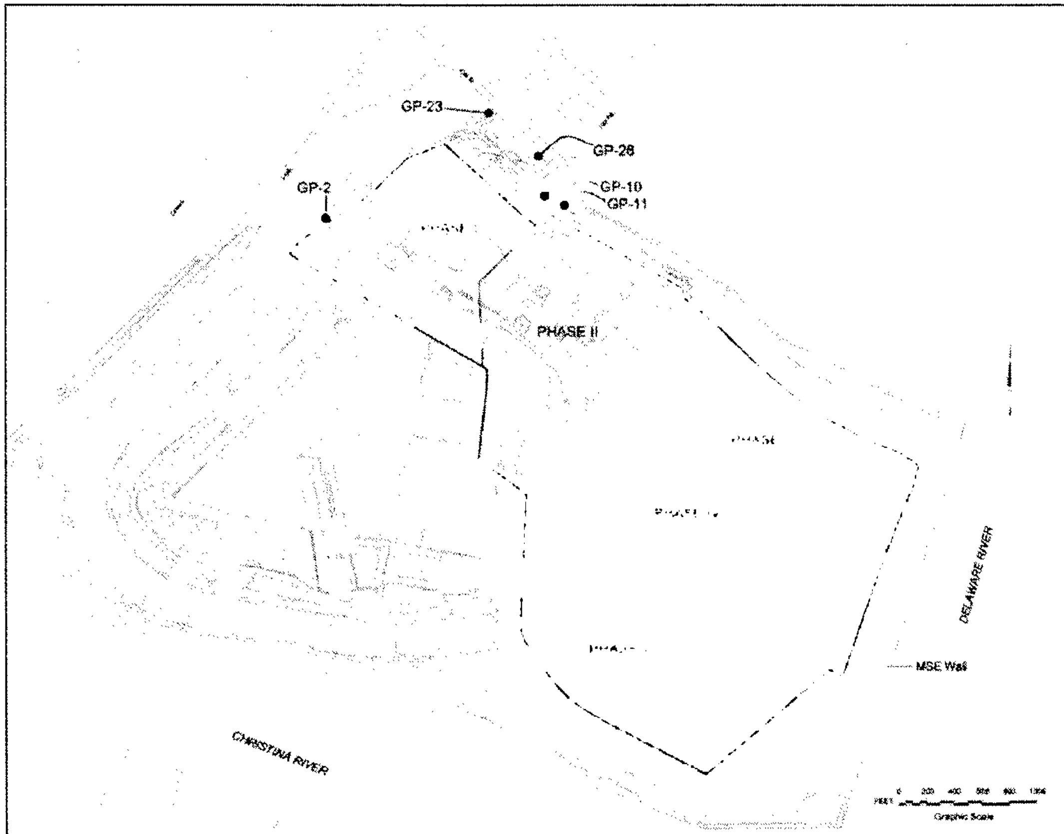
Figure 1


Building Inspection Form for Landfill Gas
DSWA Administration Building
Scale House #1
Second Floor
First Floor
Maintenance Building
Ops Storage Shed #1
Ops Storage Shed #2
Master Pump Station
LFG Storage Shed #1
GC Shed
MCC #1
MCC #2
DSWA Office Trailer
Gas Plant Office Trailer
Landfill Shop/Flare Control Room
LFG Storage Shed #2
Small Scale House
Sample Location | CH4 (%) | CO2 (%) | O2 (%) | Balance (%)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45
Sample Location | CH4 (%) | CO2 (%) | O2 (%) | Balance (%)
46 47 48 49
WEATHER INFORMATION
TIME:
TEMPERATURE: °F
RH: %
SOLAR RAD: KCals/cm2
BAROM. P.: Inches - Hg
WIND SPEED: MPH
WIND DIR.: DEGREES
CLOUD COVER %
IS PRECIPITATION OCCURRING?
CIRCLE ONE: YES NO
Instrument Calibration Log
Inspected By
Company
Date
Inspection Form Revised: February 2012

Form 1

May 17, 2007 – DAF
November 15, 2011-ADM
June 13, 2012 - ADM

Form 2



Sample Location	Time	Depth to Water (Feet)	CH4 (%)	CO2 (%)	O2 (%)	Balance Gas (%)
GP-2						100
GP-23						100
GP-26						100
GP-10						100
GP-11						100

WEATHER INFORMATION

Time:		To	
Temperature:	°F	To	°F
RH:	%	To	%
Solar Radiation:	Kcals/cm^2	To	Kcals/cm^2
Barometric Pres.:	Inches-Hg	To	Inches-Hg
Wind Speed:	MPH	To	MPH
Wind Direction:	Deg. True	To	Deg. True
Cloud Cover:			%

Is Precipitation Occuring?
Circle One: YES NO

INSPECTED BY ______ Date ______

DELAWARE SOLID WASTE AUTHORITY
1128 S. BRADFORD ST
DOVER, DELAWARE 19901

CHERRY ISLAND LANDFILL GAS MIGRATION INSPECTION FORM

DATE	SITE LOCATION	SHEET NO.
10/19/11	CHERRY ISLAND LANDFILL	1

SCALE	AUTHORIZED BY	DRAWN BY	APPROVED BY
NA	DAF	DAF	

Instruments Used for Air Quality Monitoring: Landfill Gas: LANTEC GEM 500 or GEM 2000 Landfill Gas Monitoring System
Weather: Campbell Scientific Weather Station

CALIBRATION LOG AND FIELD NOTES